PHYSICS TEST

(2)

e top portion of the page of the answer sheet that you will use in taking the Physics Test must be filled in exactly as ıustrated below. When your supervisor tells you to fill in the circle next to the name of the test you are about to take, ıark your answer sheet as shown.

○ Literature	○ Mathematics Level 1	○ German	○ Chinese Listening	○ Japanese Listening
○ Biology E	○ Mathematics Level 2	○ Italian	○ French Listening	○ Korean Listening
○ Biology M	○ U.S. History	○ Latin	○ German Listening	○ Spanish Listening
○ Chemistry	○ World History	○ Modern Hebrew		
● Physics	○ French	○ Spanish		

Background Questions: ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

After filling in the circle next to the name of the test you are taking, locate the Background Questions section, which also appears at the top of your answer sheet (as shown above). This is where you will answer the following Background Questions on your answer sheet.

BACKGROUND QUESTIONS

Please answer the three questions below by filling in the appropriate circle in the Background Questions box on your answer sheet. The information you provide is for statistical purposes only and will not affect your test score.

Question 1

How many semesters of physics have you taken in high school, including any semester in which you are currently enrolled? (Count as two semesters any case in which a full year's course is taught in a one-semester [half-year] compressed schedule.) Fill in only one circle of circles 1-3.

- One semester or less —Fill in circle 1.
- Two semesters —Fill in circle 2.
- Three semesters or more —Fill in circle 3.

Question 2

About how often did you do lab work in your first physics course? (Include any times when you may have watched a film or a demonstration by your teacher and then discussed or analyzed data.) Fill in only one circle of circles 4-7.

- Less than once a week —Fill in circle 4.
- About once a week —Fill in circle 5.
- A few times a week —Fill in circle 6.
- Almost every day —Fill in circle 7.

Question 3

If you have taken or are currently taking an Advanced Placement (AP) Physics course, which of the following describes the course? Fill in both circles if applicable. (If you have never had AP Physics, leave circles 8 and 9 blank.)

- A course that uses algebra and trigonometry but NOT calculus (Physics B) —Fill in circle 8.
- A course that uses calculus (Physics C) —Fill in circle 9.

en the supervisor gives the signal, turn the page and begin the Physics Test. There are 100 numbered circles on the ˈer sheet and 75 questions in the Physics Test. Therefore, use only circles 1 to 75 for recording your answers.

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PHYSICS TEST

Note: To simplify calculations, you may use $g = 10$ m/s^2 for the acceleration due to gravity at Earth's surface.

Part A

Directions: Each set of lettered choices below refers to the numbered questions immediately following it. Select the one lettered choice that best answers each question, and then fill in the corresponding circle on the answer sheet. A choice may be used once, more than once, or not at all in each set.

Questions 1-2

When a police car is at rest, its siren produces sound of frequency f_0. The police car is located between two observers, A and B, as shown above. The choices below give some possible comparisons between the frequencies f_A and f_B heard by the two observers and f_0.

	f_A	f_B
(A)	Equal to f_0	Equal to f_0
(B)	Higher than f_0	Higher than f_0
(C)	Higher than f_0	Lower than f_0
(D)	Lower than f_0	Higher than f_0
(E)	Lower than f_0	Lower than f_0

1. How are the frequencies related if the observers are at rest and the police car is moving to the right (toward observer B) ?

2. How are the frequencies related if the police car is at rest and both observers are moving to the right?

Questions 3-5

Each of the following lettered sets of numbers represents some physical quantity as a function of time.

Time (s) →

	1	2	3	4	5	6	7
(A)	3	3	3	3	3	3	3
(B)	1	2	3	4	5	6	7
(C)	1	4	9	16	25	36	49
(D)	12	10	8	6	4	2	0
(E)	1	2	3	4	3	2	1

For each quantity below, choose the set which might represent that quantity as a function of time.

3. The distance from the starting point of an object moving with constant positive acceleration

4. The speed of an object acted on by a constant net force opposite in direction to its velocity

5. The kinetic energy of a block moving under the influence of gravity down a frictionless inclined plane

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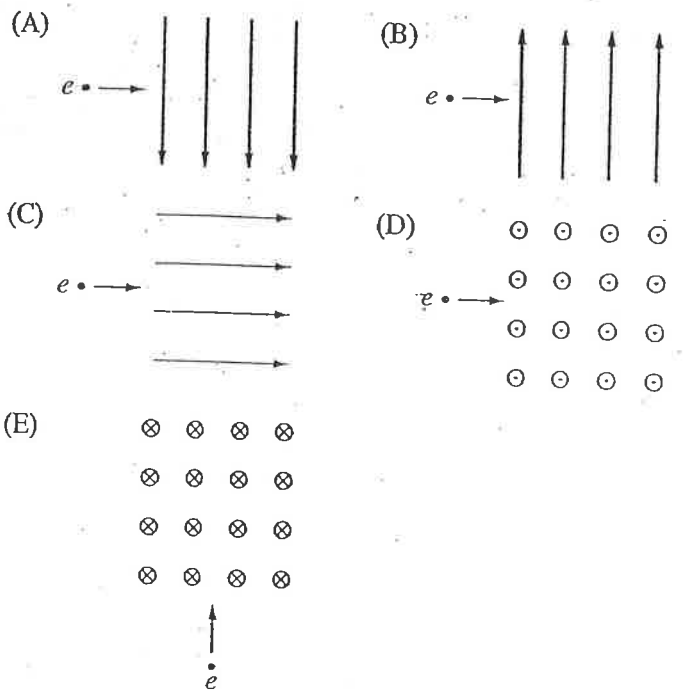
Questions 6-7

Each of the five diagrams below represents an electron e that moves in the plane of the page into a uniform magnetic field as shown. The symbol ⊗ represents a magnetic field directed into the plane of the page and the symbol ⊙ represents a magnetic field directed out of the plane of the page. The parallel lines represent magnetic fields in the directions indicated by the arrows.



6. In which diagram will the magnetic force on the electron be zero?

7. In which diagram will the magnetic force on the electron be in the plane of the page and directed initially toward the top of the page?

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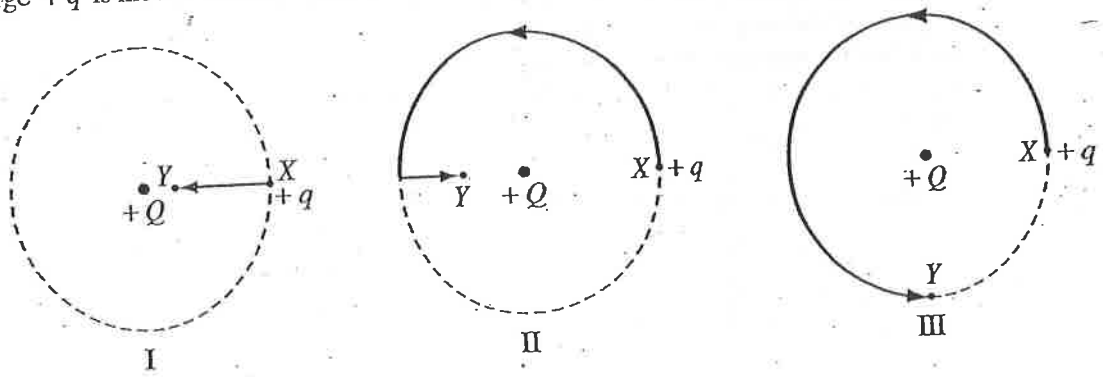
Questions 8-10

The following diagrams each represent an isolated charge $+Q$ at the center of the circle shown. In each case, a test charge $+q$ is moved from rest at X to rest at Y by an external force along the path shown.



(A) I only
(B) III only
(C) I and II only
(D) II and III only
(E) I, II, and III

8. The electric potential at Y is higher than at X in which of these cases?

9. The net work done by the external force is maximum in which of these cases?

10. No net work is done by the external force in which of these cases?

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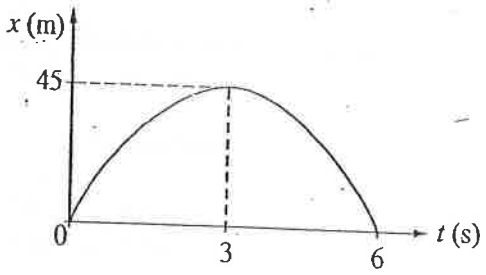
Questions 11-12 refer to the following particles.

(A) Electron
(B) Quark
(C) Proton
(D) Photon
(E) Neutron

11. Has the smallest nonzero rest mass

12. Three of these comprise a heavier particle within the nucleus

Questions 13-14 refer to the following graph.



A ball is launched straight up from ground level with an initial speed of 30 meters per second. Assume that the magnitude of the acceleration due to gravity is 10 meters per second squared and that the effect of air resistance is negligible. The height x of the ball above the ground is plotted *versus* time t in the graph above. Some values for speed and acceleration are given below.

	Speed	Acceleration
(A)	0	0
(B)	0	-10 m/s^2
(C)	30 m/s	0
(D)	30 m/s	-10 m/s^2
(E)	45 m/s	-10 m/s^2

13. What are the speed and the acceleration of the ball at $t = 3$ seconds?

14. What are the speed and the acceleration of the ball at $t = 6$ seconds (just before hitting the ground) ?

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Part B

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case and then fill in the corresponding circle on the answer sheet.

Questions 15-16

An object near the Earth falls with an acceleration of about 10 meters per second squared. On the surface of the Moon, this same object would fall with an acceleration of about 1.6 meters per second squared.

15. A person whose mass is 100 kilograms travels to the Moon. This person's mass on the Moon would be most nearly

(A) 1.6 kg
(B) 16 kg
(C) 100 kg
(D) 160 kg
(E) 625 kg

16. A person who weighs 1,000 newtons on Earth travels to the Moon. This person's weight on the Moon would be most nearly

(A) 80 N
(B) 160 N
(C) 500 N
(D) 800 N
(E) 1,000 N

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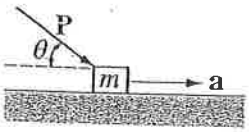
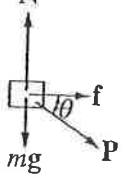
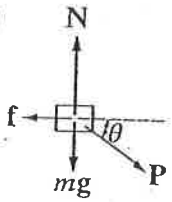
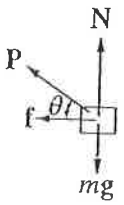
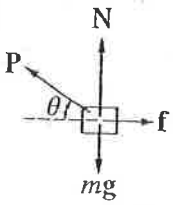


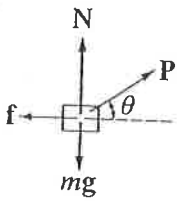
A block of mass m slides to the right on a rough surface with acceleration **a** when pushed by the force **P**, as shown above. The frictional force between the block and the surface is **f**, and the normal force is **N**. Which of the following diagrams best shows all the forces acting on the block?

(A)


(B)


(C)


(D)


(E)


18. A mass attached to the end of a horizontal spring lies on a frictionless table. When the spring is stretched a distance d and the mass is released from rest, the mass has speed v at the equilibrium point. If the spring is instead stretched a distance $2d$, the speed of the mass at the equilibrium point will be

(A) $v/2$

(B) $v/\sqrt{2}$

(C) v

(D) $\sqrt{2}v$

(E) $2v$

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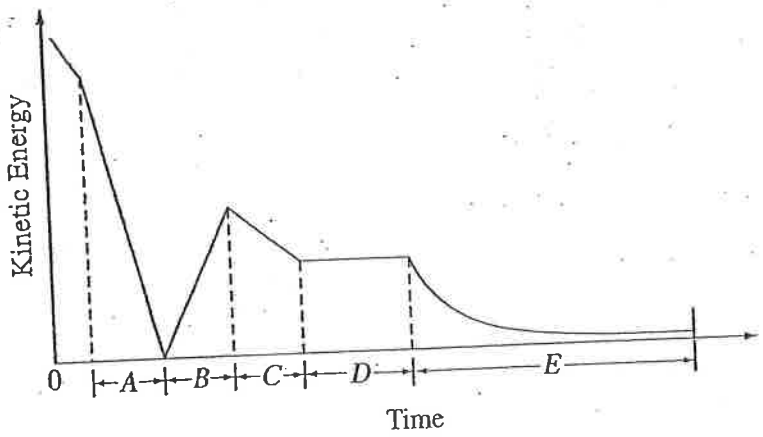
Questions 19-21

The graph below shows kinetic energy as a function of time for a cart moving in a straight line on a tabletop.



19. The cart is momentarily at rest at the end of which interval?

(A) *A*
(B) *B*
(C) *C*
(D) *D*
(E) *E*

20. The speed of the cart is constant throughout which interval?

(A) *A*
(B) *B*
(C) *C*
(D) *D*
(E) *E*

21. Which of the following quantities has a magnitude of zero throughout interval *A* ?

(A) Momentum of the cart
(B) Speed of the cart
(C) Acceleration of the cart
(D) Net force on the cart
(E) None of the quantities has a magnitude of zero.

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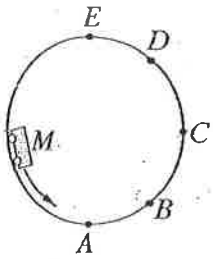
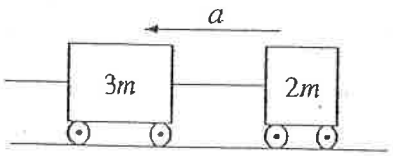


A cart of mass M travels at constant speed around a vertical circular track, as shown in the figure above. The magnitude of the normal force that the track exerts on the cart is greatest at which point on the track?

(A) A
(B) B
(C) C
(D) D
(E) E



Toy carts of mass $3m$ and $2m$, respectively, are pulled along a level, straight track with an acceleration a, as shown in the figure above. If frictional forces on the carts are negligible, what is the magnitude of the force that the string connecting the carts exerts on the cart of mass $2m$?

(A) Zero
(B) ma
(C) $2ma$
(D) $3ma$
(E) $5ma$

24. If 100 grams of water at 30°C is added to 200 grams of water at 60°C and no heat is lost to the environment, the equilibrium temperature of the combined water is

(A) 55°C
(B) 50°C
(C) 45°C
(D) 40°C
(E) 35°C

25. If the thermal energy gained by an object is known, its change in temperature can be determined if which of the following properties of the object is also known? (Assume no work is done on or by the object.)

I. Mass
II. Specific heat
III. Density

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) II and III only

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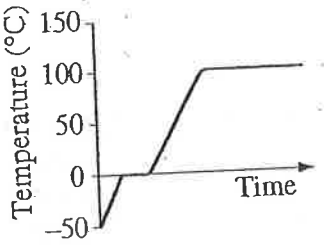
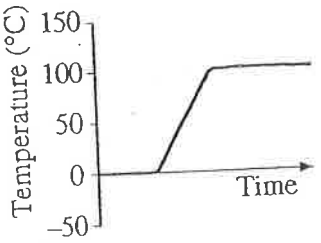
26. A sample of finely crushed ice is initially at a temperature of –50°C. Heat is then added to the sample at a constant rate until it is at 150°C. If the sample remains at atmospheric pressure throughout the process, which of the following graphs of the temperature of the sample versus time is the best representation of the process?

(A)


(B)


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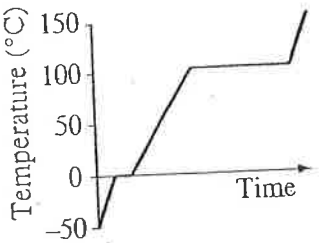
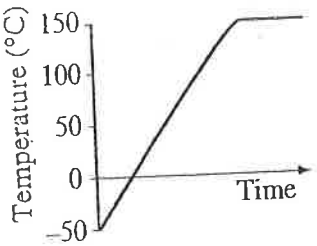
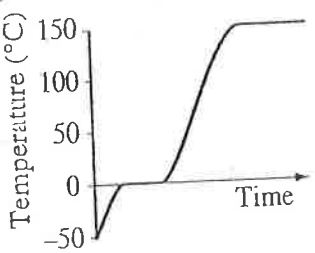


(D)


(E)


27. The person shown above igniting a piece of paper might be holding which of the following?

I. A converging lens
II. A diverging lens
III. A diverging (convex) mirror

(A) I only
(B) III only
(C) I or II only
(D) II or III only
(E) I or II or III

28. A buzzing sound from the case of a poorly constructed speaker is produced each time the sound from the speaker has a particular pitch. This is best attributed to

(A) the Doppler effect
(B) beats
(C) diffraction
(D) resonance
(E) the characteristics of a fundamental pitch

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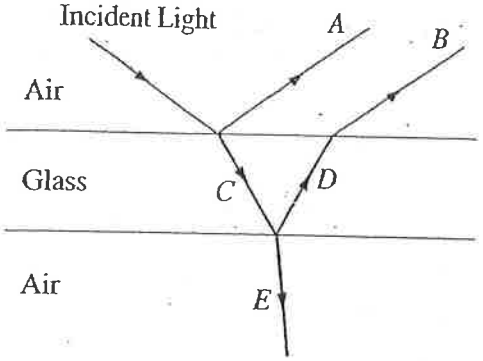


A ray of light is incident on a flat plate of glass, as shown above. Resulting reflected and refracted rays at both surfaces are also shown. Which ray is drawn at an angle to a surface that is INCORRECT?

(A) *A*
(B) *B*
(C) *C*
(D) *D*
(E) *E*

Which of the following statements about sound waves is NOT correct?

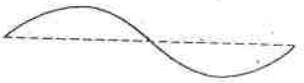
(A) Sound waves can be diffracted.
(B) Sound waves can be refracted.
(C) The angle of reflection of sound waves equals the angle of incidence.
(D) Sound waves are longitudinal waves.
(E) Sound waves become polarized when reflected at a critical angle from a smooth surface.

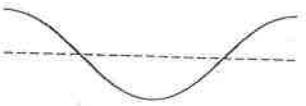
31. A standing wave is created on a string, and several photographs of one section of the string are taken. This section of the string has antinodes at both ends as shown in the photograph above. Which of the following could NOT be one of the other photographs?

(A)

(B)

(C)

(D) 

(E) 

32. If the nucleus of a neutral ^{31}P atom contains 16 neutrons, how many protons and electrons does the neutral atom contain?

	Protons	Electrons
(A)	15	15
(B)	15	16
(C)	31	16
(D)	31	31
(E)	46	46

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33. An astronaut in a spaceship travels at relativistic speed from Earth to a distant star and back again. What can be determined about the relationship between the round-trip time as measured by the astronaut and the time measured by an observer on Earth?

(A) They are the same.
(B) The astronaut's time is longer.
(C) The Earth observer's time is longer.
(D) Nothing can be determined without knowing the exact speed of the spaceship.
(E) Nothing can be determined without knowing the distance traveled.

34. What is the significant difference in the atomic structure of two isotopes of the same element?

(A) Their nuclei contain different numbers of protons.
(B) Their nuclei contain different numbers of neutrons.
(C) Their electrons are in different energy states.
(D) Only one of them can be radioactive.
(E) They form different chemical compounds.

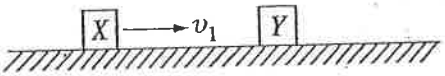
35. A ball attached to a string swings as a simple pendulum. The tension in the string is greatest when the ball is

(A) at its lowest position
(B) in the middle of its upward swing
(C) at its highest position
(D) just beginning to swing downward
(E) in the middle of its downward swing

36. Under which of the following conditions is the net force on an automobile on a straight, level road equal to zero?

I. When it is at rest relative to the road
II. When it is accelerating relative to the road
III. When it is traveling at constant speed relative to the road

(A) I only
(B) I and II only
(C) I and III only
(D) II and III only
(E) I, II, and III



37. Block X, moving with speed v_1 on a horizontal frictionless surface, collides with block Y, initially at rest. The blocks need not be of the same mass and the collision need not be elastic. Block X is brought to rest by the collision and block Y moves off with speed v_2. Which of the following is true of the ratio v_1/v_2 ?

(A) It must be greater than 1.
(B) It must be equal to 1.
(C) It must be less than 1.
(D) It depends on the value of v_1.
(E) It depends on the ratio of the masses of the blocks.

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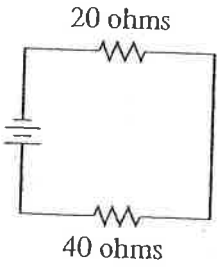
8. A net force of 8 newtons acts for 3 seconds on a 4-kilogram object that was originally at rest. At the end of the 3 seconds, what is the momentum of the object?

(A) 2 kg · m/s
(B) 6 kg · m/s
(C) 12 kg · m/s
(D) 24 kg · m/s
(E) 32 kg · m/s



Two resistors are connected in series to a battery, as shown above. If the heat that is developed in the 40-ohm resistor over a period of time is h, then the heat that is developed in the 20-ohm resistor over the same period of time is

A) $\frac{1}{8}h$

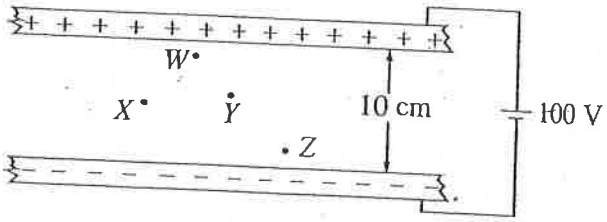
B) $\frac{1}{2}h$

(C) h

D) $2h$

E) $4h$

Questions 40-41



A positive point charge can be placed at each of four positions, W, X, Y, and Z, within a uniform electric field located between two very large conducting plates, as shown above. The plates are separated by 10 centimeters and have a potential difference of 100 volts.

40. Which of the following is a correct statement about the electric force on the point charge?

(A) The force at position X would be zero because X is equidistant from both plates.
(B) The force at position W would be the greatest because the potential there is the greatest.
(C) The force at position Y would be the greatest because it is aligned with the center of the plates.
(D) The force at position Z would be the greatest because it is closest to the negative plate.
(E) The force would be the same for all positions.

41. What is the magnitude of the force acting on a 2-microcoulomb charge placed at position W?

(A) 5×10^{8} N
(B) 5×10^{2} N
(C) 2×10^{-3} N
(D) 2×10^{-4} N
(E) It cannot be determined from the information given.

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42. Particle X is known to be positively charged. When located midway between charged particles Y and Z, as shown above, there is no net electrical force exerted on X. When Y is removed, X is attracted to Z. If gravitational effects are ignored, one can correctly conclude which of the following?

I. Z is negatively charged.
II. Y is positively charged.
III. The magnitudes of the charges on Y and Z are equal.

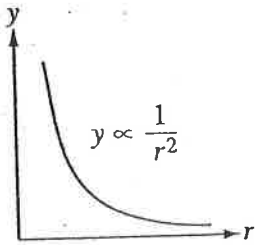
(A) I only
(B) II only
(C) I and III only
(D) II and III only
(E) I, II, and III

43. The light emitted by a monochromatic laser consists of photons, each with an energy of 2.0 electron-volts. A second laser emits light with a wavelength only one-half the wavelength of the first. What is the energy of the photons emitted by the second laser?

(A) 1.0 eV
(B) 1.5 eV
(C) 2.0 eV
(D) 2.5 eV
(E) 4.0 eV

44. Which of the following does NOT correctly pair the physicist with a topic that he worked on?

(A) Copernicus . . heliocentric theory
(B) Galileo . . heat energies
(C) Michelson . . the speed of light
(D) Kelvin . . heat and temperature
(E) Huygens . . wave theory



45. Which of the following CANNOT be represented by the graph above?

(A) Gravitational force, y, *vs.* distance between masses, r
(B) Intensity of light, y, *vs.* distance from a light source, r
(C) Intensity of sound, y, *vs.* distance from the source of the sound, r
(D) Electrostatic force, y, *vs.* distance between electric charges, r
(E) Electric potential, y, *vs.* distance from a charged sphere, r

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6. A sound wave that has a frequency of 70 hertz, a wavelength of 5 meters, and a speed of 350 meters per second travels through air toward the right. The wave strikes a stationary wall and is reflected back toward the left. Correct descriptions of the reflected wave include which of the following?

I. Speed = 350 m/s
II. Frequency = 140 Hz
III. Wavelength = 2.5 m

(A) I only
(B) III only
(C) I and II only
(D) II and III only
(E) I, II, and III

7. A guitar string is tuned by turning the tuning knob. Which of the following properties related to the vibrating string would remain constant as the tuning knob is turned?

I. Tension in the string
II. Frequency of standing waves in the string
III. Wavelength of standing waves in the string

(A) I only
(B) III only
(C) I and II only
(D) II and III only
(E) I, II, and III

48. Beats are heard by an observer when two sound waves with nearly equal frequencies interfere. Which of the following is true of the beat frequency?

(A) It is midway between the frequencies of the two waves.
(B) It is greater than either of the two wave frequencies.
(C) It depends on the sum of the two wave frequencies.
(D) It depends on the difference of the two wave frequencies.
(E) It depends on the amplitudes of the two waves.

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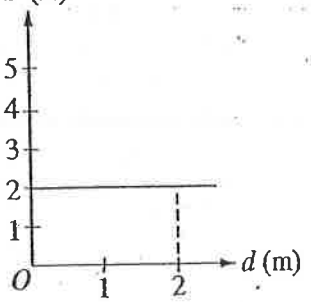
49. The graphs below show the force F acting on identical objects as a function of the distance d that the objects move. In all cases, the force and the direction of motion are along the same straight line. In which case does the force do the greatest amount of work during the interval between $d = 0$ and $d = 2$ meters?

(A)



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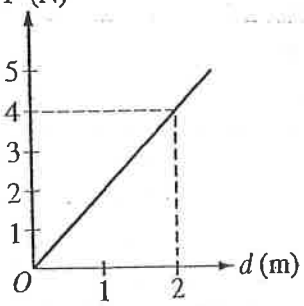

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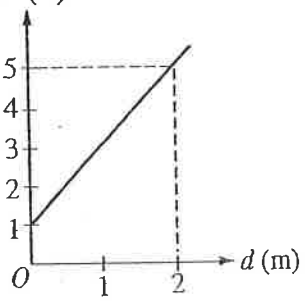

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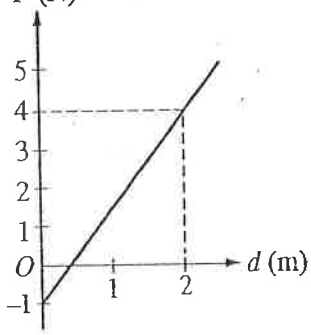
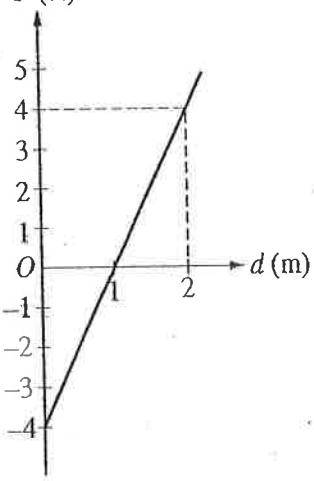


(E)



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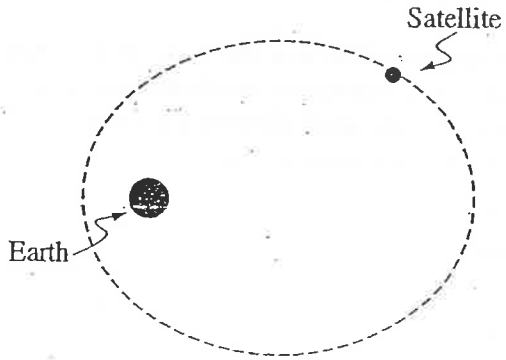
). A toy car of mass 0.1 kilogram travels in a horizontal circular path around a track of radius 0.5 meter at a constant speed of 5 meters per second. The magnitude of the centripetal force that the track exerts on the car is

(A) zero
(B) 0.25 N
(C) 0.5 N
(D) 1 N
(E) 5 N



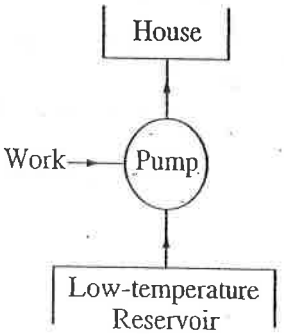
An artificial satellite is in an elliptical orbit around Earth, as shown above. Which of the following properties of the satellite will remain constant? (Assume that frictional effects are negligible.)

I. Potential energy
II. Acceleration
III. Angular momentum

(A) I only
(B) III only
(C) I and II only
(D) II and III only
(E) I, II, and III

52. A system is composed of a number of objects at different temperatures that are placed in contact and thermally insulated from their surroundings. Which of the following is the physical principle that governs the flow of heat among the objects?

(A) The temperature of each of the objects must increase.
(B) The temperature of each of the objects must decrease.
(C) The entropy of each object must decrease.
(D) The entropy of the system must increase.
(E) The internal energy of the system must become zero.



53. An ideal heat pump is used to heat a house. For each cycle, a motor does 50 joules of work on the pump, and the pump absorbs 60 joules of heat from a low-temperature reservoir. How many joules of heat does the pump deliver to the house each cycle?

(A) 10 J
(B) 50 J
(C) 55 J
(D) 110 J
(E) 3,000 J

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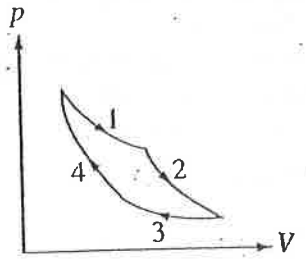

54. An ideal gas undergoes a 4-step process and returns to its original state, as shown in the above graph of pressure p *versus* volume V. For steps 1 and 3, temperature is constant. For steps 2 and 4, no heat is exchanged with the gas. True statements include which of the following?

I. For steps 1 and 3, the internal energy of the gas is constant.
II. For steps 2 and 4, no net work is done by the gas or on the gas.
III. The gas is at the same temperature at the beginning and at the end of the cycle.

(A) I only
(B) II only
(C) I and III only
(D) II and III only
(E) I, II, and III

55. Which of the following pairs includes, respectively, an example of a very good electrical insulator and a very good electrical conductor?

(A) Salt water and copper
(B) Rubber and glass
(C) Copper and steel
(D) Glass and silk
(E) Glass and aluminum

56. The force that a charged particle experiences in a uniform magnetic field is in general a function of which of the following?

I. The velocity of the particle
II. The charge of the particle
III. The intensity of the magnetic field

(A) II only
(B) III only
(C) I and II only
(D) I and III only
(E) I, II, and III

57. The magnitude of the magnetic force on a straight section of wire that carries an electric current is greatest when the angle between the magnetic field and the section of wire is

(A) 0°
(B) 30°
(C) 45°
(D) 60°
(E) 90°

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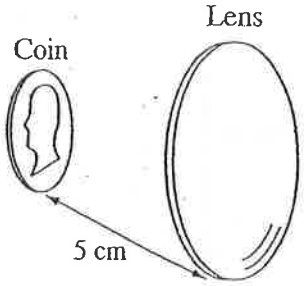

58. A lens is used to view a small coin placed 5.0 centimeters from the lens, as shown above. A virtual image of the coin is observed at 30 centimeters from the lens. The ratio of the diameter of the image to the diameter of the coin is

(A) 6.0
(B) 5.0
(C) 2.0
(D) 0.80
(E) 0.20

59. When light waves are incident on a single slit, the pattern beyond the slit has regions of low or zero intensity and regions of high intensity primarily because

(A) there is interference between waves from various parts of the slit
(B) the slit does not allow all wavelengths of light to pass through
(C) the incident wave cannot fit through the gap of the slit
(D) the waves cannot spread around the edges of the slit
(E) light reflects off the edges of the slit

60. A lens, made of glass with an index of refraction of 1.50, has a focal length $f = 25$ centimeters when in air. When it is immersed in water with an index of refraction of 1.33, its focal length is

(A) negative
(B) positive but less than 25 cm
(C) equal to 25 cm
(D) greater than 25 cm but finite
(E) infinite

61. A particular electromagnetic wave used for television transmission has a wavelength of 1.5 meters. If the speed of light is 3×10^8 meters per second, what is the frequency of the transmitter?

(A) 2.2×10^{-9} Hz
(B) 5×10^{-9} Hz
(C) 2×10^{8} Hz
(D) 4.5×10^{8} Hz
(E) 5×10^{8} Hz

62. The charged oil-drop experiment of Robert Millikan was the first conclusive experimental demonstration that

(A) electrons have a negative charge
(B) electrons are particles
(C) electrons have wave properties
(D) atoms contain negatively charged electrons
(E) electric charge is found as integer multiples of a certain unit charge

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63. A large and a small ball, made of the same uniform density foam, are released at the same time from the same height above Earth. After 1 second the large ball is observed to have fallen farther than the small ball. Which of the following explains this observation?

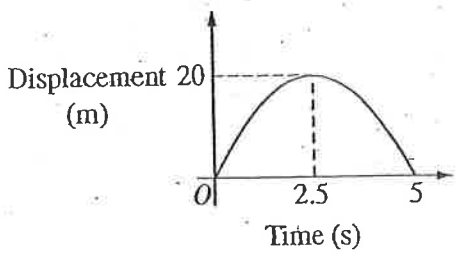
(A) The large ball weighs more than the small ball.
(B) The gravitational force on the large ball is greater.
(C) The buoyant force of the air on the large ball is greater.
(D) The large ball has a greater ratio of mass to surface area.
(E) Water vapor in the air adheres to the small ball more readily and thus increases its mass.

64. Observations that support the theory of an expanding universe include which of the following?

I. The Doppler redshift observed in the majority of the galaxies
II. The existence of an all-pervasive background radiation in the universe
III. The elliptical orbits of the planets in the solar system

(A) II only
(B) III only
(C) I and II only
(D) I and III only
(E) I, II, and III

Questions 65-66



A cart moves in a straight line. The cart's displacement, in meters, from its starting point is plotted above as a function of time, in seconds.

65. The instantaneous speed of the cart at 2.5 seconds is

(A) –16 m/s
(B) –8 m/s
(C) –4 m/s
(D) 0 m/s
(E) +4 m/s

66. During the interval 0-5 seconds, the average velocity of the cart is

(A) 0 m/s
(B) 2 m/s
(C) 4 m/s
(D) 8 m/s
(E) 16 m/s

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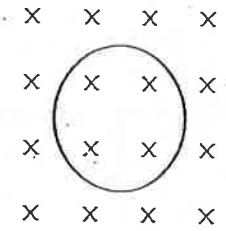
7. A satellite is in a circular orbit around Earth. Considered from the point of view of an inertial reference frame, why does the satellite not fall and crash on Earth?

(A) There is no force of gravity on the satellite.
(B) The force of gravity on the satellite is just balanced by a frictional force, so that the net force on the satellite is zero.
(C) The force of gravity on the satellite is just balanced by a centrifugal force, so that the net force on the satellite is zero.
(D) The force of gravity on the satellite is just balanced by the buoyant force of the atmosphere, so that the net force on the satellite is zero.
(E) The satellite is accelerating toward Earth but never gets any closer to it because of the orbital velocity of the satellite.



68. A circular wire loop is held perpendicular to a uniform magnetic field, as shown above. The magnitude of the magnetic field changes with time. For which of the following would the current induced in the loop by the field have a different value?

I. Using a loop of larger radius
II. Using a loop with higher resistance
III. Increasing the rate at which the magnetic field changes

(A) I only
(B) III only
(C) I or II only
(D) II or III only
(E) I, II, or III

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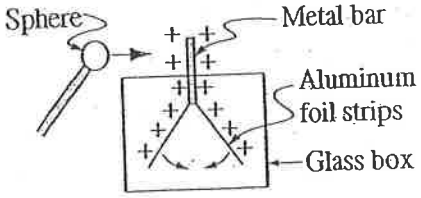
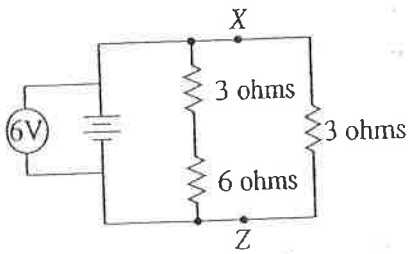


69. An electroscope carries a positive charge, as shown above. As a small sphere on an insulating stick is brought slowly toward the bar without touching the bar, the foil strips move toward each other. The sphere could be

(A) a negatively charged conductor
(B) a positively charged conductor
(C) a positively charged insulator
(D) an uncharged insulator
(E) a grounded insulator



70. In the circuit shown above, the potential difference across the battery is 6 volts and the conducting wires have negligible resistance. The potential difference between points X and Z is

(A) $\frac{2}{3}$ V
(B) 1 V
(C) 2 V
(D) 6 V
(E) 9 V

71. An electron has a charge of magnitude 1.60×10^{-19} coulomb. The number of electrons that pass a particular point during one second on a wire that carries a constant current of 1.60 amperes is most nearly

(A) zero
(B) 1.00×10^{-19}
(C) 2.56×10^{-19}
(D) 1.00×10^{19}
(E) 2.56×10^{19}

72. The weight of a person at Earth's surface is W. Assume that the radius of Earth were made twice as great but that the mass of Earth remained the same. The weight of the person at the new surface of Earth would then be

(A) unchanged
(B) $W/4$
(C) $W/2$
(D) $2W$
(E) $4W$

73. Planet X has an acceleration due to gravity of 5 m/s^2. Planet Y has an acceleration due to gravity of 20 m/s^2. If a pendulum has a period of 1 second on Earth, where the acceleration due to gravity is 10 m/s^2, which of the following describes the periods on the other planets?

	Period on X	Period on Y
(A)	Greater than 1 s	Greater than 1 s
(B)	Greater than 1 s	Less than 1 s
(C)	Less than 1 s	Less than 1 s
(D)	Less than 1 s	Greater than 1 s
(E)	Equal to 1 s	Equal to 1 s

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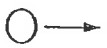
74. A block sliding north on a surface with negligible friction collides with and sticks to another block sliding east. Conservation laws that apply during this collision include which of the following?

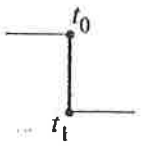
I. Conservation of mechanical energy
II. Conservation of kinetic energy
III. Conservation of linear momentum

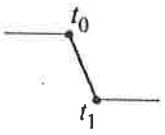
(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

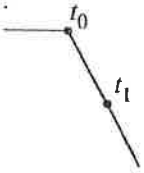


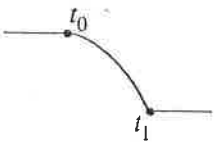
Top View

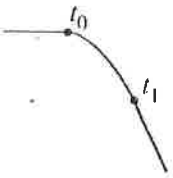
75. A disk sliding on ice with negligible friction initially moves to the right at constant speed, as shown above. Between times t_0 and t_1, a constant force is exerted on the disk toward the bottom of the page. At time t_1, the force is removed. Which of the following diagrams best shows the path of the disk?

(A) 

(B) 

(C) 

(D) 

(E) 

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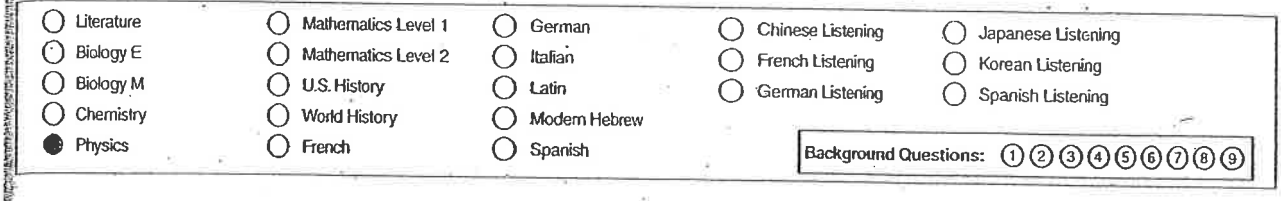
NO TEST MATERIAL ON THIS PAGE

PHYSICS TEST

The top portion of the page of the answer sheet that you will use in taking the Physics Test must be filled in exactly as illustrated below. When your supervisor tells you to fill in the circle next to the name of the test you are about to take, mark your answer sheet as shown.



After filling in the circle next to the name of the test you are taking, locate the Background Questions section, which also appears at the top of your answer sheet (as shown above). This is where you will answer the following Background Questions on your answer sheet.

BACKGROUND QUESTIONS

Please answer the three questions below by filling in the appropriate circle in the Background Questions box on your answer sheet. The information you provide is for statistical purposes only and will not affect your test score.

Question 1

How many semesters of physics have you taken in high school, including any semester in which you are currently enrolled? (Count as two semesters any case in which a full year's course is taught in a one-semester [half-year] compressed schedule.) Fill in only one circle of circles 1-3.

- One semester or less —Fill in circle 1.
- Two semesters —Fill in circle 2.
- Three semesters or more —Fill in circle 3.

Question 2

About how often did you do lab work in your first physics course? (Include any times when you may have watched a film or a demonstration by your teacher and then discussed or analyzed data.) Fill in only one circle of circles 4-7.

- Less than once a week —Fill in circle 4.
- About once a week —Fill in circle 5.
- A few times a week —Fill in circle 6.
- Almost every day —Fill in circle 7.

Question 3

If you have taken or are currently taking an Advanced Placement (AP) Physics course, which of the following describes the course? Fill in both circles if applicable. (If you have never had AP Physics, leave circles 8 and 9 blank.)

- A course that uses algebra and trigonometry but NOT calculus (Physics B) —Fill in circle 8.
- A course that uses calculus (Physics C) —Fill in circle 9.

When the supervisor gives the signal, turn the page and begin the Physics Test. There are 100 numbered circles on the answer sheet and 75 questions in the Physics Test. Therefore, use only circles 1 to 75 for recording your answers.

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